

of different types of boilers from the point of view of warship requirements.

The Admiralty do not get much guidance from the report, and we understand that they only intend to supersede the Belleville boilers by those of Babcock and Wilcox and of the Yarrow types in a few vessels recently ordered, for which the boilers have not yet been put in hand. They had previously arranged for one of the recent cruisers to be fitted with boilers of the Niclausse type. The experiments recommended by the committee will doubtless be carried out as quickly as possible, after which there may be sufficient data available for determining the policy of the future.

The committee's report is distinctly disappointing, and suggests that their experience and judgment were not sufficiently matured to give much value to an interim statement. They seem to have been impressed by the advantages of good water-tube boilers for naval purposes, and to have realised that an ideal water-tube boiler—which, however, has not yet been approached in practice—would be much better for the Navy than the old cylindrical boiler. When they have to choose the best of the types that are available, they name four which they have had under consideration and recommend early experiments with them, and there they leave the matter. Meanwhile, the construction of battleships and their machinery must go on, and the Admiralty engineers are in the difficult position of having to decide upon the boilers for them. This task is not rendered easier for the Admiralty in carrying on the work of the Navy, nor is any one helped in forming an opinion upon the best policy for the future by the fact that the objections to the Belleville boiler which are pointed out by the committee apply, in a greater or less degree, to others that might be substituted for it. One thing that appears certain is that whatever the defects of water-tube boilers may be, or may be thought to be, their advantages to a warship are sufficiently proved to make a return to cylindrical boilers in the fighting navies of the world extremely improbable.

FORESTRY IN GREAT BRITAIN.

IT is probably known to most people that for the supply of our requirements in the matter of timber, as in that of foodstuffs, we depend largely upon imports from abroad. But it may be doubted if many beyond the comparatively few who have given special attention to the subject have realised the fact that the annual cost to the country of these imports amounts to somewhere about twenty-five millions of pounds. It has been often urged that it would be worth some trouble to prevent this large sum, or a portion of it, going out of the country, and it has been pointed out that a proper system of forest management would bring about this result. Of course, so long as the foreign supply is ample and the price of imported timber is less than that at which it is profitably produced at home, our markets will continue to absorb foreign produce as heretofore; but these conditions which have hitherto prevailed are, in the opinion of experts, not likely to continue. For some years past this and cognate questions have attracted considerable attention, as witness the writings of recent date noted below,¹ all of which are deserving of careful perusal. The burden of all of them may be summed up in the phrase cited by a writer in the *Times* of March 17, 1899. "‘Cotton,’ it is said on the other side of the Atlantic,

‘was once called king; but King Cotton is a lesser potentate than King Timber must soon become.’" In other words, the world's demand for timber is outrunning the supply under present methods, and an appreciation of timber values is therefore setting in which is likely to be permanent and progressive. Cheap timber is probably a thing of the past in this country. To some such a declaration will only appeal as the old cry of "wolf," and they may argue that any scarcity of timber will be balanced by the substitution for it, in many cases, of other suitable products; and such substitution has, no doubt, in the past taken place, as, for example, in shipbuilding. But it must be remembered that facility of transport has by now led to inroads into the world's timber capital in practically every timber-producing region, and the ruthless destruction of virgin forest without attempt at regeneration has brought us now within measurable distance of the end of the natural supply; and, further, in recent years the applications of timber to other purposes than those of construction, as, for example, in the manufacture of wood-pulp, have made it an efficient substitute for other products, and thus the demands for it have been multiplied, and may be yet increased. In these circumstances, then, not from any sentimental ideas connected with the growing of timber at home, but from the standpoint of business principles, the question of the growing of timber in Great Britain to an extent which shall in some measure make us less dependent upon foreign supply is one which has now assumed practical importance.

That wood can be profitably grown in Great Britain, even under the unscientific methods now in operation, has been amply proved; that under a system of scientific management crops of timber could be raised to yield a certain and adequate return upon capital is demonstrable. What lies at the bottom of the absence of such crops in this country is want of appreciation, from land-owners down to the working forester, of the right principles upon which they can be grown. There is, speaking generally, no practice of scientific forestry in Great Britain. Other immediate causes there are which have contributed more or less to the neglect of scientific forestry in Britain, for instance, tenure of land, the claims of sport—this probably one of the most influential factors—the rating of woods, and so forth. These are obstacles, and no doubt will remain so, in the way of tree-planting; but assuredly were our landed proprietors, land-agents and foresters better instructed in the methods of growing timber and in the possibilities of remunerative crops, less would be heard of them as such. It is difficult to instil into those who have been brought up in other traditions the fact that trees which are to yield a crop of timber must be grown under rules as definite as those which govern the cultivation of ordinary agricultural crops, because the time which is required for the maturation of the crop and the securing of the final yield exceeds the lifetime of the individual. Yet it can only be when this fundamental fact has been realised that a supply of marketable home-grown timber will be available in Great Britain.

There are not, it is gratifying to note, wanting indications that already some proprietors, even the Government, are appreciating the necessity and the advantage of cultivating their woods upon rational lines. Working plans for the economical management of woods have been prepared and adopted upon estates of the Earl of Selborne in Hampshire—of which an account will be found in the *Transactions* of the Royal Scottish Arboricultural Society already cited—of the Duke of Bedford at Woburn, of Mr. Munro Ferguson at Raith and Novar, and in the Forest of Dean the Government has similarly arranged a working plan. These working plans, which are a novelty in the country, are worthy of study by those who own woodlands, for they indicate the method which ought to be followed upon every estate where it is desired to grow wood for profit. Hitherto proprietors who

¹ "Forest Management, with Suggestions for the Economic Treatment of Woodlands in the British Isles" (*Trans. Surveyors Inst.*, 1900); "Canadian Trade with Great Britain" (*Contemp. Review*, Jan. 1900); "British Forestry and its Prospects" (*Trans. Roy. Scot. Arbor. Soc.*, vol. xvi. part 11, 1900); "Deficient Production of Timber in the World" (*Trans. Eng. Arbor. Soc.*, vol. iv. part 111, 1900); "Outlook for the World's Timber Supply." Report of a lecture by Dr. W. Schlich (*Journal of the Society of Arts*, March 1).

may have desired to cultivate their woods on scientific principles may have met with the difficulty of obtaining expert advice; but such a difficulty no longer exists, for there are in this country now retired forest-officers of the Indian service to whom proprietors may readily go for sound and safe guidance. At the same time we cannot hope that the cultivation of crops of timber in this country will attain the dimensions which it must do if it is to affect to an appreciable extent the market supply of timber until means for the acquisition of knowledge of scientific principles underlying it are available to those to whom woods belong and to those who have the direct management of the woods. Within the last decade several trustworthy text-books upon forestry have appeared, but our only school for instruction in forestry at the present time is that at Coopers Hill. Coopers Hill is, however, open only to entrants to the Indian Forest Service, and there is no institution in the country to which any one desiring a thorough acquaintance with the principles of forestry can go. Our Universities are now alive to the claims of agriculture as a subject of study, and agricultural colleges are being formed in different districts. How long will it be before the Universities recognise that forestry also is worthy of attention, or the agricultural colleges take up the subject in their curricula? It is matter of common knowledge that a committee appointed by the Secretary of State for India recently reported in favour of the transference to Cambridge of the forest-school from Coopers Hill. As yet, however, no action has been taken upon the recommendation. The Secretary of State may rest assured that such a transference would be a reform meeting with the hearty approval of men of science, and the presence at Cambridge of such a school would give an opportunity to undergraduates connected with the landed interest to obtain some acquaintance with a subject of intimate concern to them. The influence of this upon the prosperity of the country would ultimately be most beneficial. As has been said above, ignorance is the real cause of our present condition as a wood-growing country, and until systematic instruction is provided in some of our Universities or colleges there will be no great reformation in forestry practice, although there may be amelioration through the action of intelligent and far-seeing individual proprietors.

THE CONCRETIONS OF THE CONNECTICUT VALLEY.¹

THE curiously-shaped concretions met with in the Champlain clays of the Connecticut Valley have for many years attracted attention. Indeed, so long ago as 1670 some specimens were sent to the Royal Society of London. A detailed description of them and of their mode of occurrence, illustrated by fourteen beautiful quarto plates, has now been issued by Mr. J. M. Arms Sheldon. Four principal types of concretions are met with; some are discs which call to mind the Kimeridge coal-money; some are cylindrical or club-like, one example (probably a compound one) being a little more than twenty-two inches long; others are botryoidal, and not a few are "queer little images" resembling "fishes, birds, ant-eaters, elephants, dogs, babies' feet," &c. (Fig. 1).

These occur in stratified river-drift clays, some of which are of a kind suitable for modelling, and some are more or less gritty. The most remarkable point is that "each clay bed has a form of concretion peculiar to itself," that is to say, the principal types are never found together. The author has seen "forty-eight specimens from one bed so similar it was impossible to tell one from another."

¹ "Concretions from the Champlain Clays of the Connecticut Valley." 4to. (Boston, 1900.)

Compound forms occur, where, for instance, two or even three discs have coalesced or been joined together (Fig. 2); and intermediate stages of such examples, and of immature concretions of horse-shoe type, are met with.

These remarkable bodies occur along the planes of bedding in the clays, and the lines of stratification may sometimes be seen to run in unbroken continuity through concretion and clay. In composition they consist of argillaceous and somewhat sandy limestone with small amounts of iron-oxide, magnesia and manganese oxide. They contain from 42 to 56 per cent. of carbonate of lime, whereas the clay possesses but 2 or 3 per cent. The concretions spread out laterally in the clay, as if water holding carbonate of lime in solution made its way

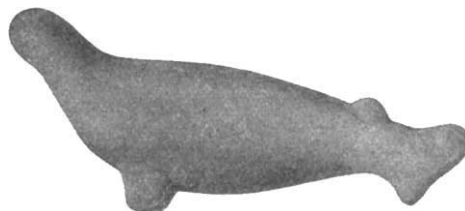


FIG. 1. - An animal form of concretion.

along the planes of stratification; and unless in the case of tiny spheroidal concretions they are almost invariably flattened. No doubt they are due to the obscure process of segregation, whereby the mineral matter, tending to collect together, has been unable to assume definite crystallographic shape, but has concentrated itself in nodular form. Some of the concretions show evidence of concentric structure, but no appreciable nucleus has, as a rule, been seen, though it might have consisted of a particle of carbonate of lime. Evidently the concretionary process went on in a quiet way, but not always uninterruptedly, as indicated by the distinct stages of growth seen in some specimens. The shape of the concretions is held to be partly determined by the structure

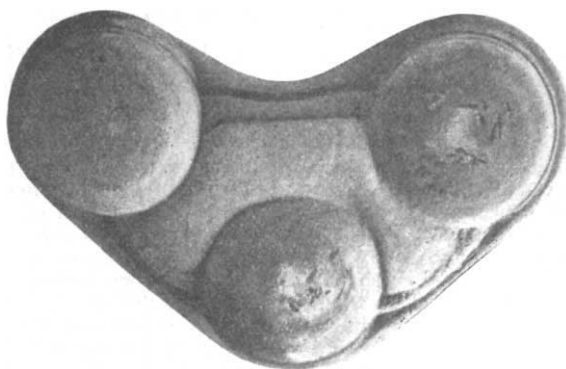


FIG. 2. - A treble form of symmetrical concretion.

and composition of the matrix which holds it, and by the amount of carbon dioxide and other organic acids present.

The author concludes his work with a useful bibliography, wherein the well-known researches of De la Beche, and the observations of A. H. Green and others are mentioned; but we miss the name of Sedgwick, who, in 1835, brought the matter before the Geological Society of London. The author, however, does not enter into the general question of concretionary structures; his work is essentially local, but it will be none the less interesting to those who give attention to the subject.

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